TunerStudio MS Lite Reference

MS3 1.4.x Supplement

Megasquirt-3 Product Range

Dated: 2014-12-20

MS3 Firmware Version: 1.4.x

This version of the documentation applies to the Megasquirt-3 range of products which includes:

- MS3 using the V3.0 or V3.57 mainboards;
- MS3-Pro
- Products derived from the MS3-Pro Module, e.g.,MSPNP-Pro

Applies to firmware MS3 1.3.x

MS3-Pro customers may prefer to use the MS3-Pro manuals.

This version of the documentation ***DOES NOT*** apply to:

- Megasquirt-1;
- EMS Pro;
- Megasquirt-2;
- Microsquirt
- Microsquirt-module or any products using it.

Table of Chapters

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1 Introduction

1.1 Overview

This manual is a supplement to the Megasquirt3 TunerStudio MS Lite Reference-1.3 manual and covers new features added in the 1.4 firmware that are not included in that manual.

This version of the documentation applies to the Megasquirt-3 range of products running the MS2/Extra firmware. The products in this range include:

- Megasquirt-3, often simply referred to as MS3;
- MS3-Pro;
- MS3-Gold
- Products derived from the MS3-Pro Module, e.g., MSPNP-Pro

In this guide Megasquirt will be used to refer to any of the above products unless a setting varies according to a specific Megasquirt-3 product. In this event the products will be named explicitly.

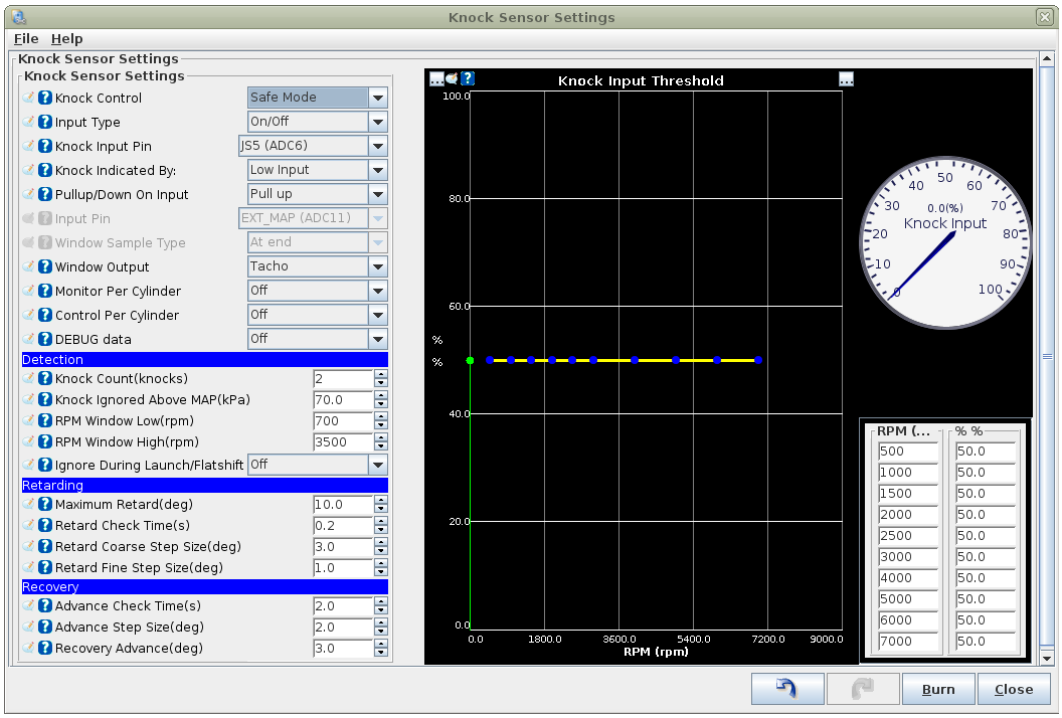
Megasquirt ECUs are designed to give enhanced flexibility in terms of engine control. They are designed for track, educational, and other off-road use. **Certain jurisdictions place environmental controls over the use of aftermarket ECUs. Please check your local legislative controls before using a Megasquirt with your engine.**

2 New / Changed features

2.1 Ignition Settings

The "Flip polarity on hi-res tach / cam" settings can now be used to invert the cam polarity if needed for modes where this was not previously possible.

2.2 Knock Sensor Settings



Retarding timing on a per-cylinder basis is now possible.

2.3 Accel enrichment

A secondary set of enrichments are available for use with Flex Blending

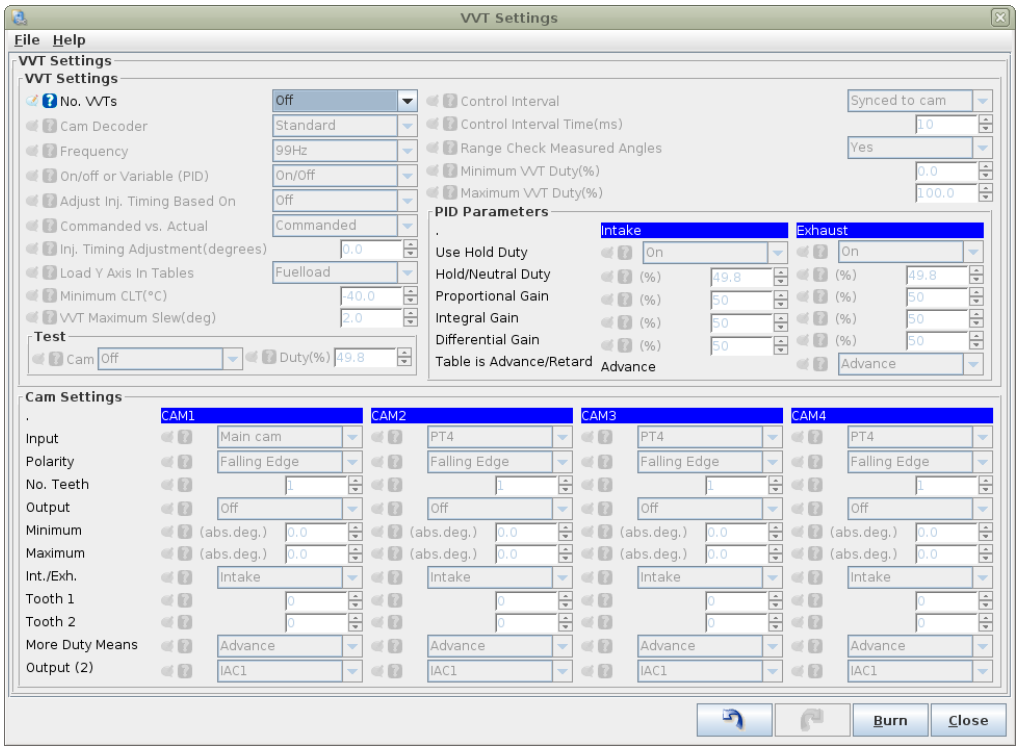
2.4 Boost Control Settings

The initial value table has been replaced by a "bias" table and more classic PID is used. To tune the bias table a "setup" Tuning mode is available. The table is tuned as an open loop table, with the closed-loop refining the duty.

Boost Control Bias Duty 1 always applies to boost channel 1, even in the case of table switching or blending.

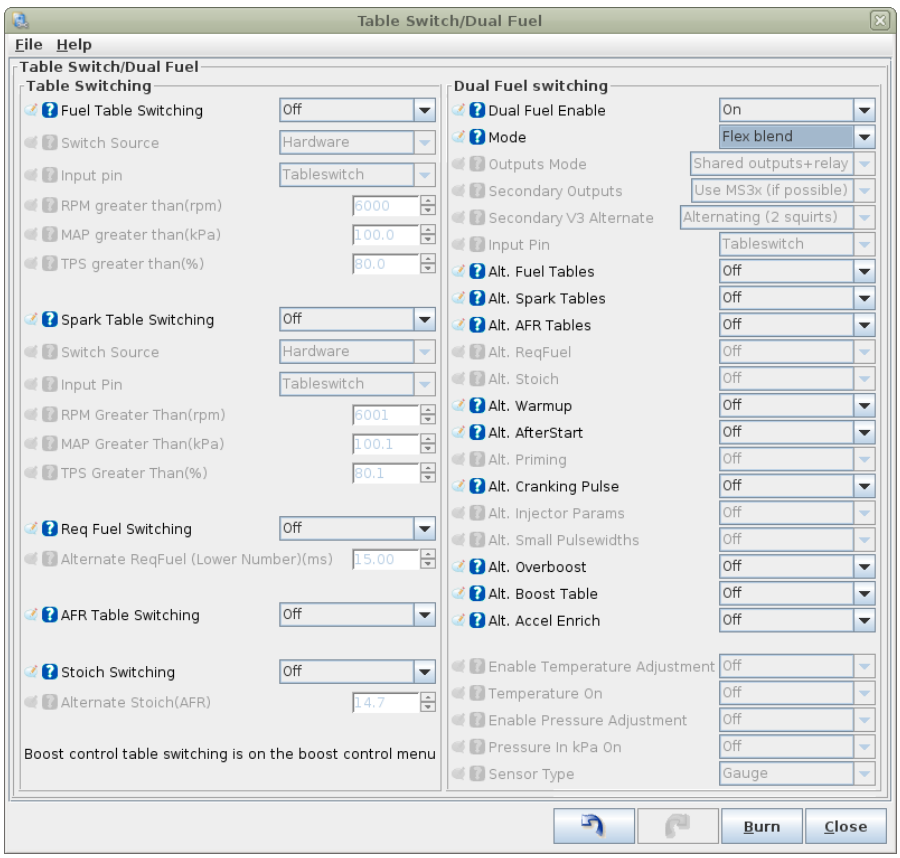
2.5 VVT Settings

The VVT settings have been changed for BMW S54 and S62 engines that use two solenoids per VANOS. Eight outputs in total are now possible.



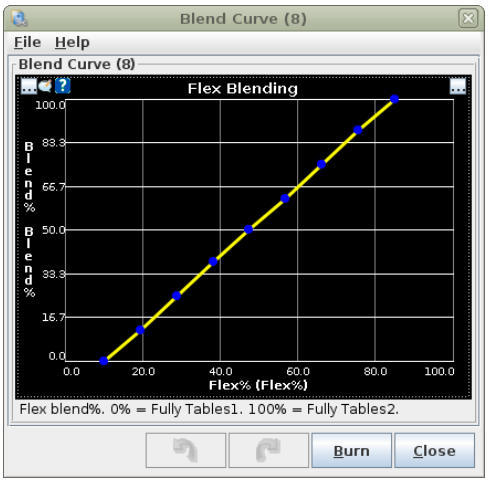
2.6 Dual Fuel / Table Switching

Flex Blending is a new option for Mode.



2.7 Blend Curve (8) Flex Blending

This is the curve to control the blending between tables based on Flex fuel percentage.

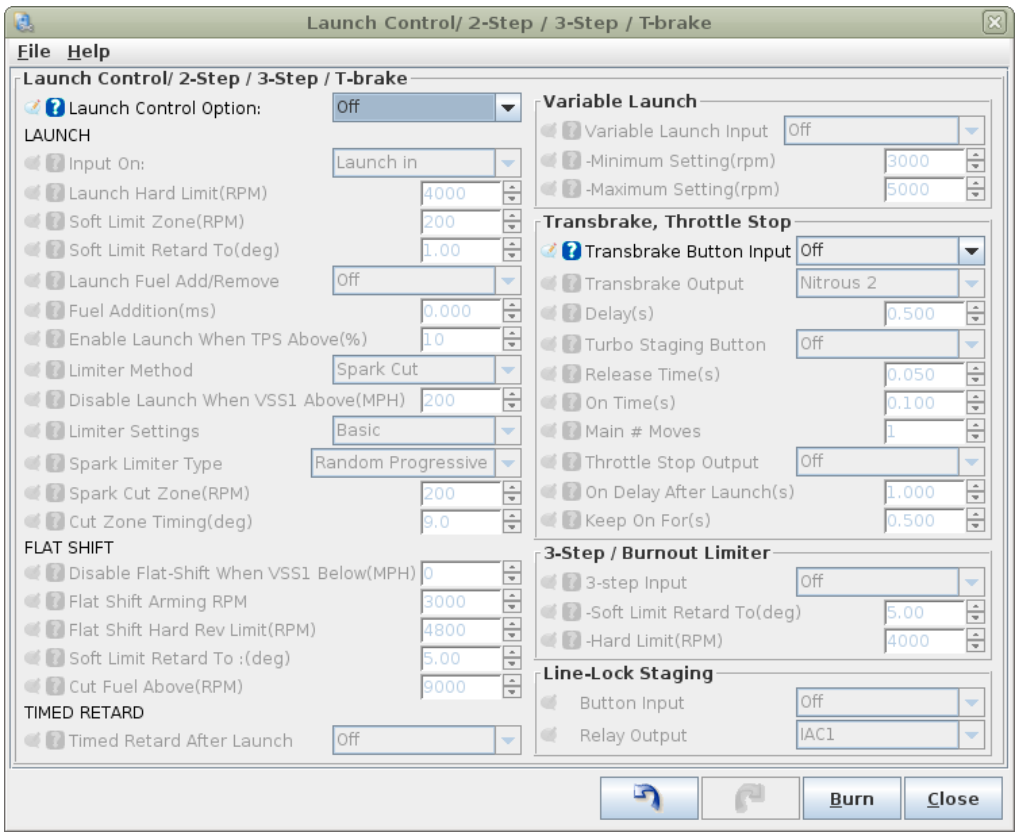


2.8 EGT

Fuel adder can now be per cylinder.

2.9 Launch / 2-step / 3-step / T-brake

There is now a Line-Lock Staging feature.



2.10 Sequential Shift Cut

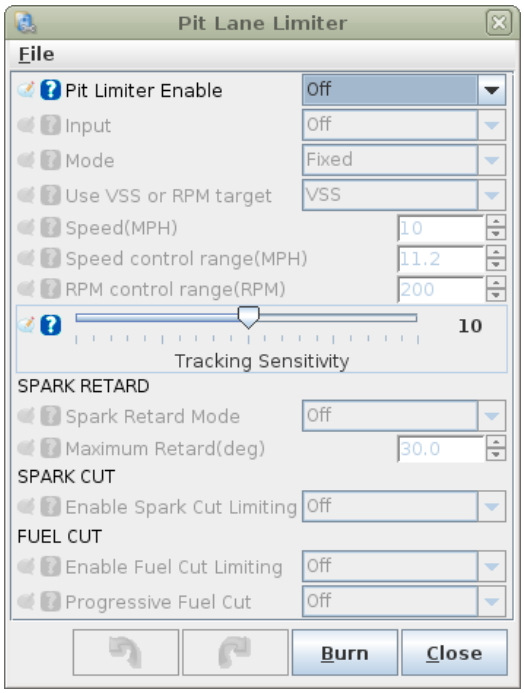
There is now an option to cut fuel also.

2.11 Nitrous System

VSS based progressive now an option.

2.12 Pit Lane Limiter

This may be subject to change.



Pit Limiter Enable

Enables Pit Lane Limiter

Input

Switch input.

Mode

Fixed = one fixed limiter speed

Holding = takes speed when button pressed as limiter and holds it.

Use VSS or RPM Target

Whether VSS or RPM is used as the hold target.

Speed

Fixed speed limit.

Speed control range

Control range of speed to apply limiters across. 5mph recommended as a starting point. Setting the range too small will cause oscillation.

RPM control range

Control range of RPM to apply limiters across. Setting the range too small will cause oscillation.

Tracking sensitivity

Adjust tracking sensitivity to adjust limiter window. Initially the 0% fuel/spark cut is applied at the limit and full cut is applied at the limit+range. If the speed is above the limit, the lower limiting point is lowered slowly.

Spark Retard Mode

Whether to use spark retard.

Maximum Retard

Maximum allowed spark retard.

Enable Spark Cut Limiting

Whether to use spark cut. (Can cause backfires and exhaust damage.)

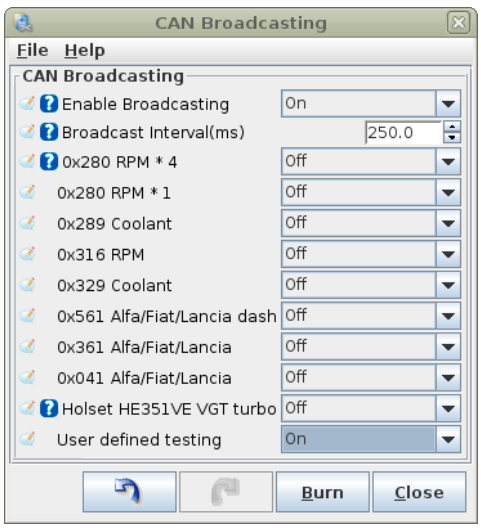
Enable Fuel Cut Limiting

Whether to use fuel cut.

Progressive Fuel Cut

Whether to use a progressive fuel cut (sequential only.)

2.13 CAN Broadcasting

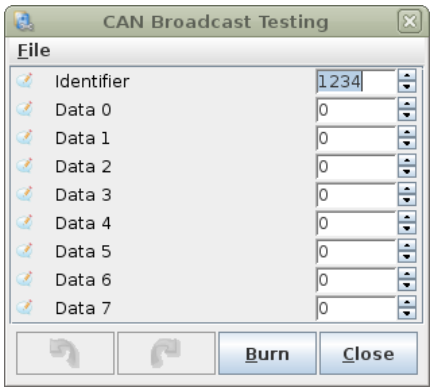


Two new options

Holset HE351VE VGT turbo - this broadcasts 'boost duty' with a 29bit CAN identifier specific to the turbo.

User defined testing - allows custom CAN packets to be broadcast

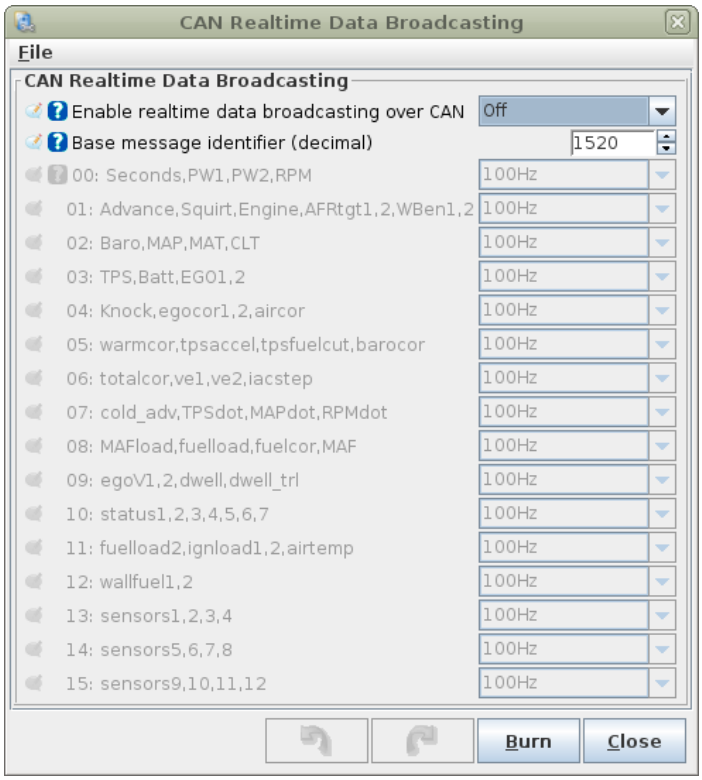
2.14 CAN Broadcast testing



A custom identifier (decimal) and payload can be broadcast.

2.15 CAN Realtime Data Broadcasting

This is a major enhancement allowing all of the engine parameters to be broadcast to the CAN using standard 11bit identifiers which can then be received and displayed by suitable 3rd party dashes or dash loggers.



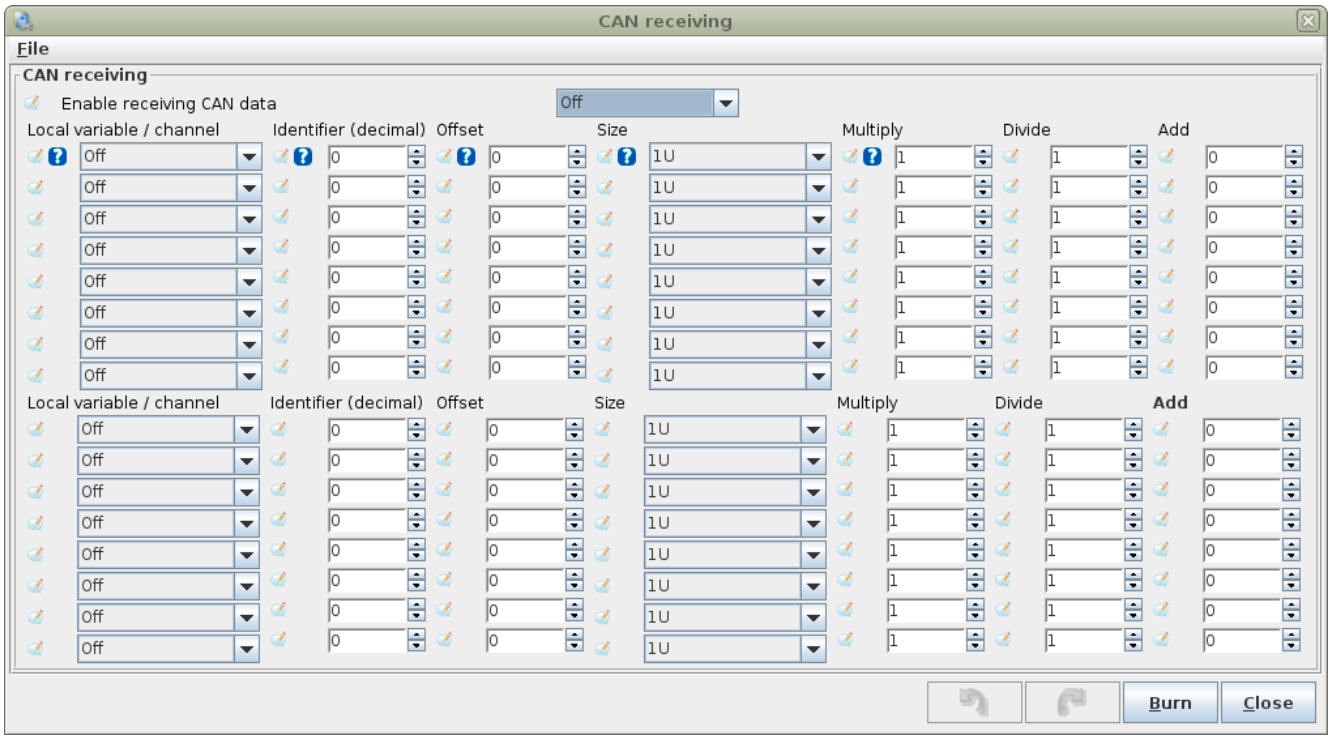
Once enabled, the user can select which data packets to broadcast and at what frequency. Be aware that the maximum capacity of CAN is around 4000 packets per second i.e. 40 channels at 100Hz. For reliable operation of other devices on the network it is suggested that a lower limit of 1-2000 be applied.

More technical details of this feature are available in a specific PDF available from http://www.msextra.com/doc/pdf/

2.16 CAN Receiving

Another major enhancement is the ability to receive and process standard 11bit CAN messages. These can be

used to collect remote sensor data or wheel speed from ABS modules etc.



Local variable/channel

Megasquirt variable to store resulting data to. This can this be used by other subsystems.

Identifier (decimal)

11bit CAN identifier to listen for. (See also Offset)

Offset

Offset of data within each 8-byte CAN message.

For systems sending sequential messages, you need to calculate the actual identifier and offset.

e.g. Take the offset and divide by 8. e.g. offset = 19. Divide by 8 gives 2 remainder 3. Add 2 to the identifier and the offset is 3.

Size

Endianism, data size and sign.

B = Big endian

(Motorola, high byte first)

L = Little endian

(Intel, low byte first)

= # bytes

U = Unsigned

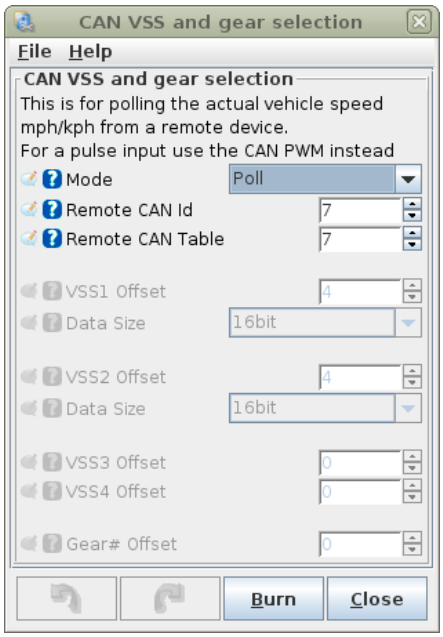
S = Signed

Multiply, Divide, Add

Result = ((raw_data * mult) / divide) + add

2.17 CAN VSS and Gear

The page has been re-arranged slightly.



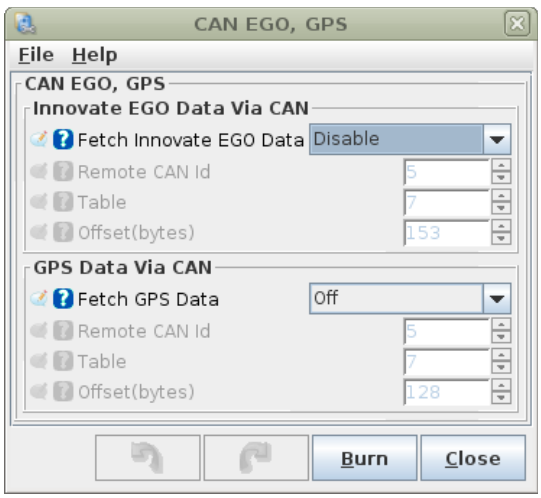
Mode

Poll - traditional method using Megasquirt CAN to fetch data from a expansion board.

Listen - Expansion board just sends the data.

2.18 CAN EGO / GPS

Same settings, own page.

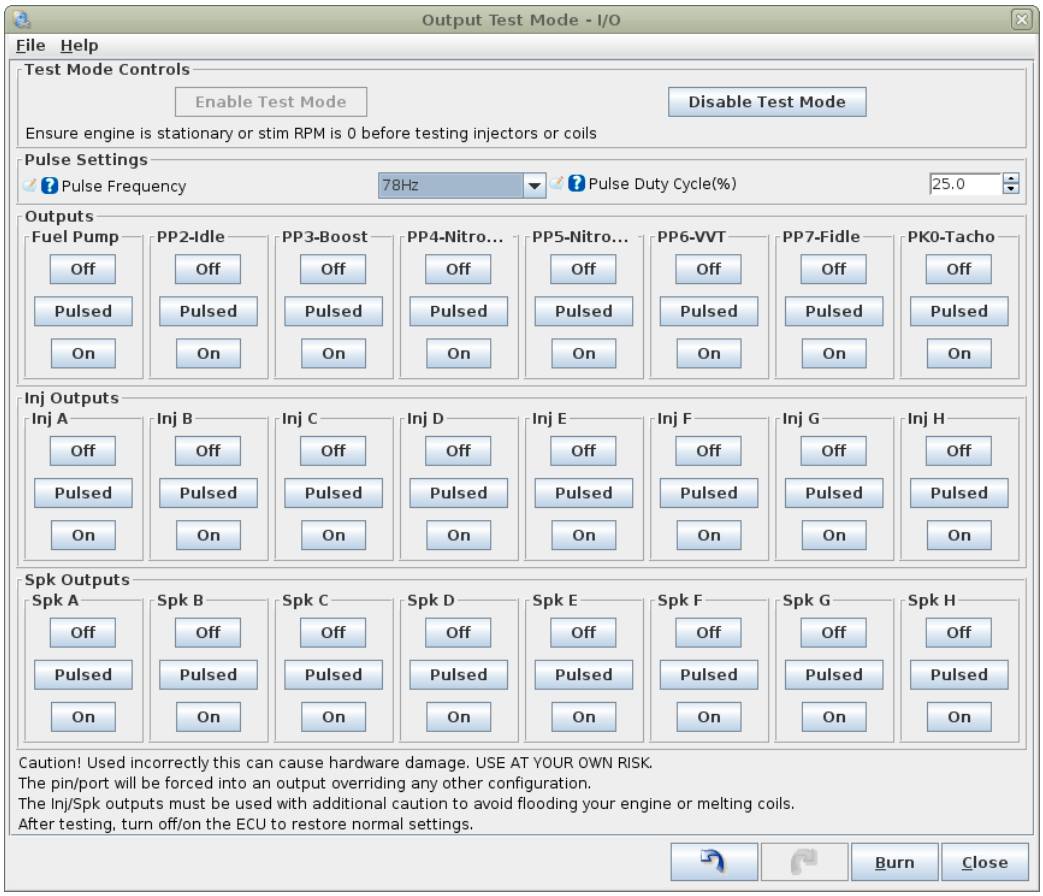


2.19 IO-Box Settings

These are covered in the IO-box manual, need to duplicate here.

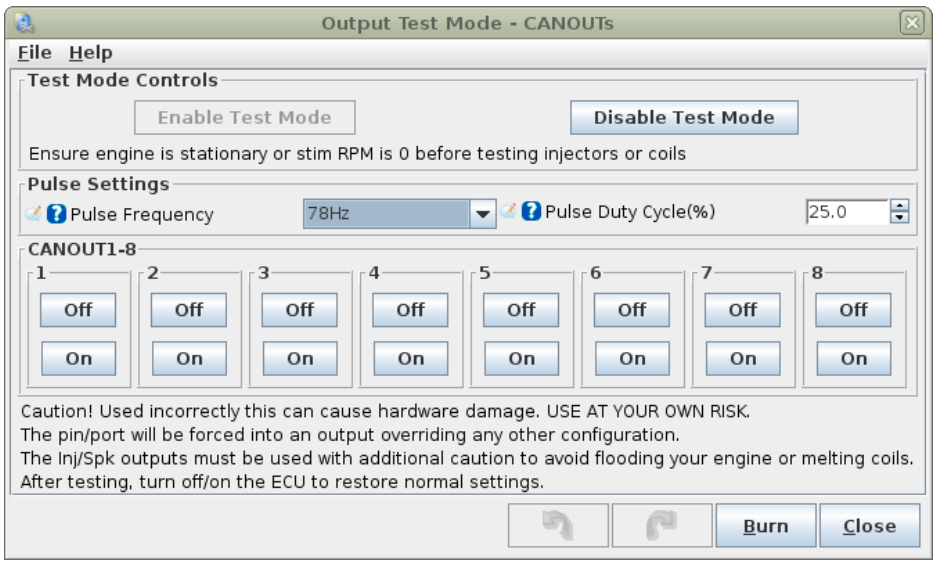
2.20 Output Test Mode - I/O

The test mode has been expanded to allow control of all outputs.



2.21 Output Test Mode - CANOUTs

This allows expansion board outputs to be tested. (Expansion board required.)



2.22 Datalogged fields

Some more fields added.

3 Revision history

2014-12-20	Revision history started.